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(54) **METHOD AND APPARATUS FOR MANAGING A GAMING APPLICATION**

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(52) **U.S. Cl.** **463/25; 463/40**

(58) **Field of Classification Search** **463/25, 463/40; 709/220; 706/21**
See application file for complete search history.

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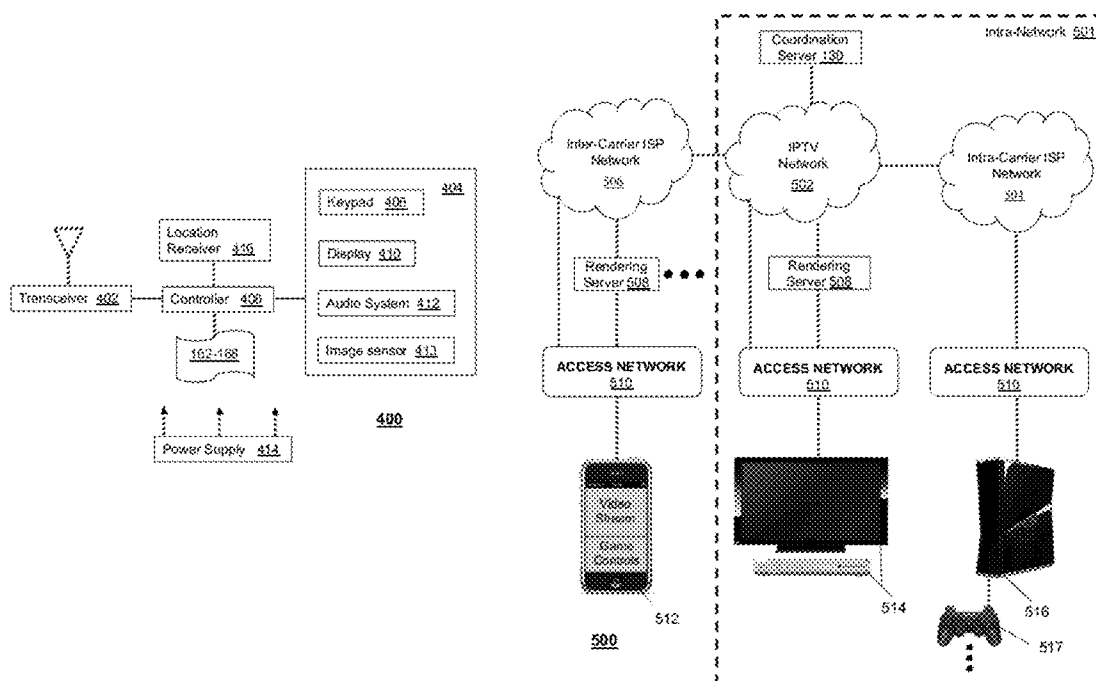
Primary Examiner — Masud Ahmed

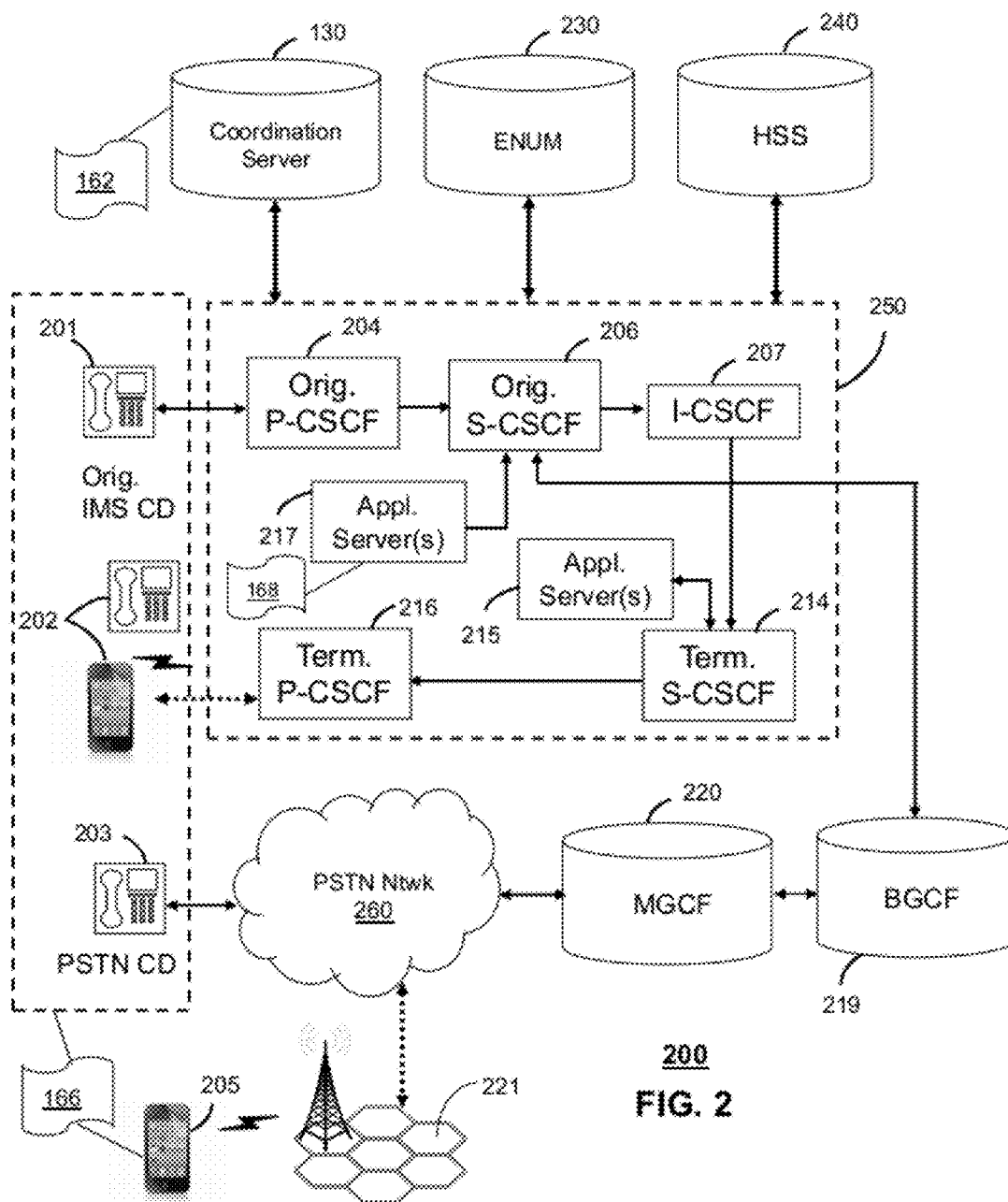
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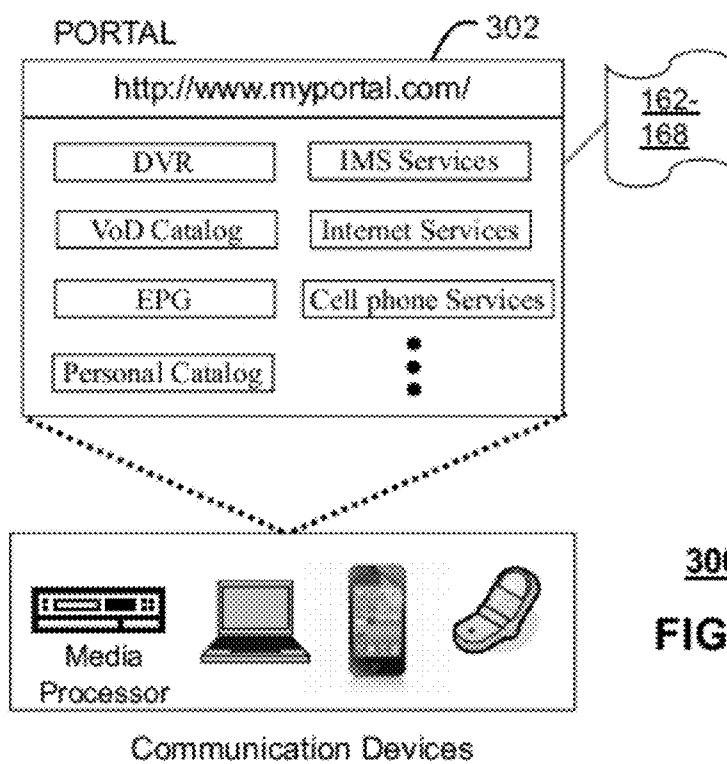
(57) **ABSTRACT**

A system that incorporates teachings of the present disclosure may operate, for example, according to a method for receiving a request to coordinate execution of a gaming application between a communication device and at least one device remotely located from the communication device, selecting a game rendering server from a plurality of game rendering servers according to a determination of at least one characteristic of the communication device, and instructing the game rendering server to transmit a stream associated with the gaming application responsive to determining that the communication device is unable to execute in whole or in part the gaming application from local computing resources of the communication device. The method can further include coordinating an exchange of first control information and second control information between the communication device and the at least one device. Other embodiments are disclosed.

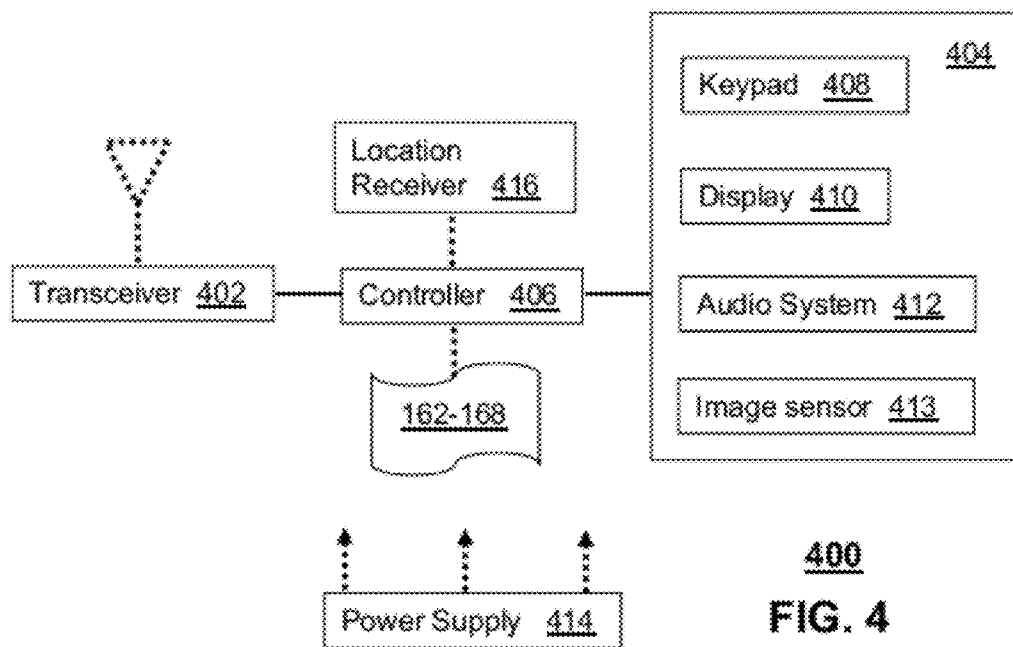
17 Claims, 6 Drawing Sheets



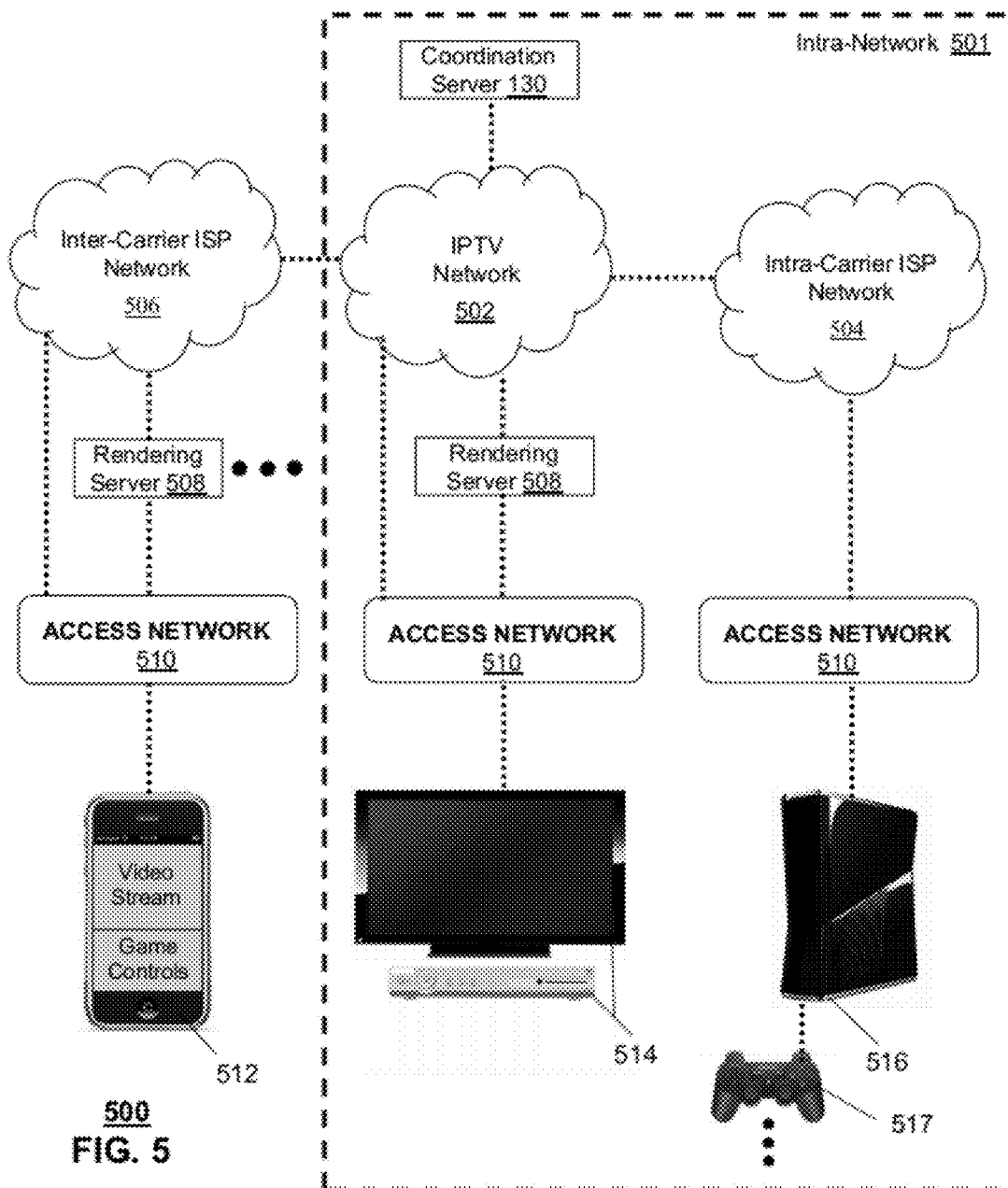


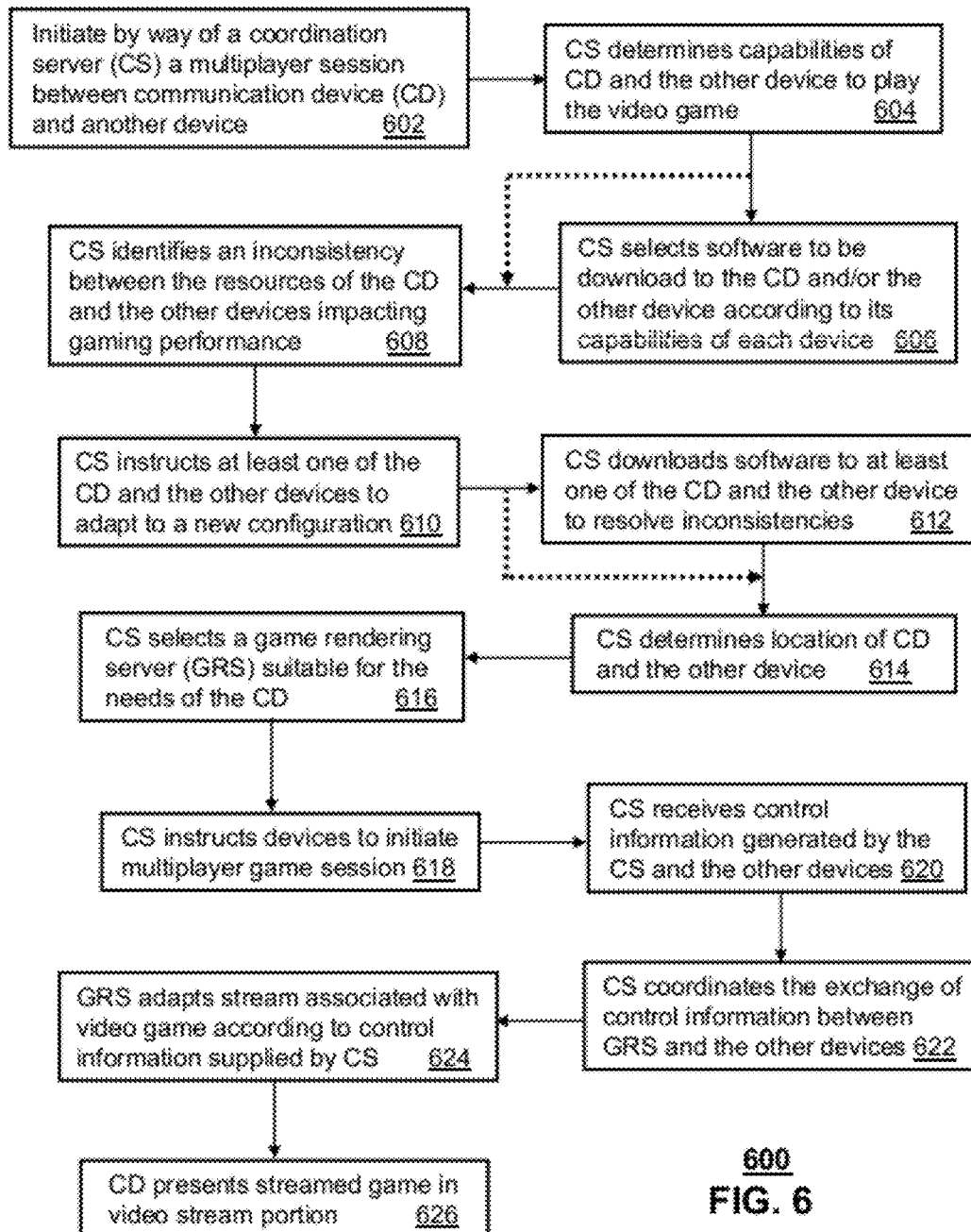


300
FIG. 3



400
FIG. 4





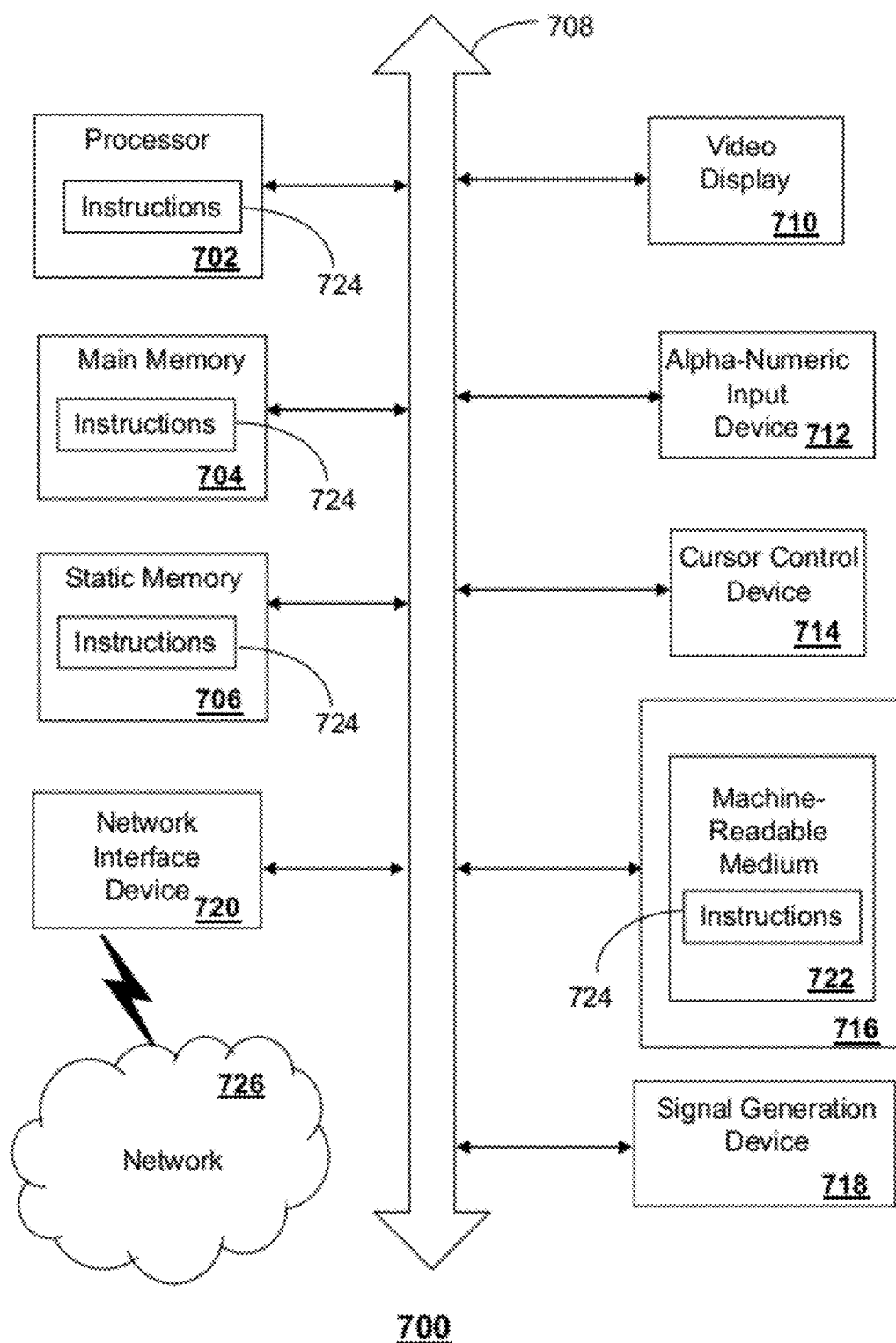


FIG. 7

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METHOD AND APPARATUS FOR MANAGING A GAMING APPLICATION

FIELD OF THE DISCLOSURE

The present disclosure relates generally to gaming applications and more specifically to a method and apparatus for managing a gaming application.

BACKGROUND

Gaming consoles today support multiplayer games which can be played from a single gaming console, or between gaming consoles located in remote locations when players are subscribed to online gaming services. Smart phones are also adapted to download games which users can play individually from their smart phone or between users of smart phones over a wireless communication system.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1-2 depict illustrative embodiments of communication systems that provide media services;

FIG. 3 depicts an illustrative embodiment of a web portal for interacting with the communication systems of FIGS. 1-2;

FIG. 4 depicts an illustrative embodiment of a communication device utilized in the communication systems of FIGS. 1-2;

FIG. 5 depicts an illustrative embodiment of a system for enabling gaming applications between devices;

FIG. 6 depicts an illustrative embodiment of a method operating in portions of the systems described in FIGS. 1-5; and

FIG. 7 is a diagrammatic representation of a machine in the form of a computer system within which a set of instructions, when executed, may cause the machine to perform any one or more of the methods discussed herein.

DETAILED DESCRIPTION

The present disclosure describes, among other things, illustrative embodiments of a system for enabling gaming applications at one or more communication devices. Other embodiments are contemplated by the present disclosure.

One embodiment of the present disclosure includes a computer-readable storage medium in a coordination server having computer instructions to receive from a communication device a request to initiate a video game with at least one device remotely located from the communication device, determine a location of the communication device, select a game rendering server from a plurality of game rendering servers according to the location of the communication device, and instruct the game rendering server to transmit a video stream associated with the video game responsive to determining that the communication device is unable to execute in whole or in part the video game from local computing resources of the communication device. The computer-readable storage medium can further include computer instructions to receive first control information generated by the communication device, receive second control information generated by the at least one device, and coordinate an exchange of the first control information and the second control information to enable a multiplayer game of the video game between the communication device and the at least one device.

One embodiment of the present disclosure includes a method for receiving a request to coordinate execution of a

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gaming application between a communication device and at least one device remotely located from the communication device, selecting a game rendering server from a plurality of game rendering servers according to a determination of at least one characteristic of the communication device, and instructing the game rendering server to transmit a stream associated with the gaming application responsive to determining that the communication device is unable to execute in whole or in part the gaming application from local computing resources of the communication device. The method can further include receiving first control information generated by the communication device, receiving second control information generated by the at least one device, and coordinating an exchange of the first control information and the second control information between the communication device and the at least one device.

One embodiment of the present disclosure includes a rendering server having a memory, and a processor coupled to the memory. The processor can be adapted to receive instructions from a coordination server to transmit to a communication device a stream associated with a gaming application responsive to a determination by the coordination server that the communication device is unable to process in whole or in part the gaming application from local computing resources of the communication device, and transmit the stream to the communication device. The processor can further be adapted to receive from the coordination server first control information and second control information, where the first control information is generated by the communication, where the second control information is generated by at least one device, and where the coordination server is adapted to coordinate an exchange of the first control information and the second control information to enable a multiplayer game between the communication device and the at least one device.

FIG. 1 depicts an illustrative embodiment of a first communication system 100 for delivering media content. The communication system 100 can represent an Internet Protocol Television (IPTV) media system. The IPTV media system can include a super head-end office (SHO) 110 with at least one super headend office server (SHS) 111 which receives media content from satellite and/or terrestrial communication systems. In the present context, media content can represent, for example, audio content, moving image content such as 2D or 3D videos, video games, virtual reality content, still image content, and combinations thereof. The SHS server 111 can forward packets associated with the media content to one or more video head-end servers (VHS) 114 via a network of video head-end offices (VHO) 112 according to a common multicast communication protocol.

The VHS 114 can distribute multimedia broadcast content via an access network 118 to commercial and/or residential buildings 102 housing a gateway 104 (such as a residential or commercial gateway). The access network 118 can represent a group of digital subscriber line access multiplexers (DSLAMs) located in a central office or a service area interface that provide broadband services over fiber optical links or copper twisted pairs 119 to buildings 102. The gateway 104 can use common communication technology to distribute broadcast signals to media processors 106 such as Set-Top Boxes (STBs) which in turn present broadcast channels to media devices 108 such as computers or television sets managed in some instances by a media controller 107 (such as an infrared or RF remote control).

The gateway 104, the media processors 106, and media devices 108 can utilize tethered communication technologies (such as coaxial, powerline or phone line wiring) or can

operate over a wireless access protocol such as Wireless Fidelity (WiFi), Bluetooth, Zigbee, or other present or next generation local or personal area wireless network technologies. By way of these interfaces, unicast communications can also be invoked between the media processors **106** and sub-

systems of the IPTV media system for services such as video-on-demand (VoD), browsing an electronic programming guide (EPG), or other infrastructure services.

A satellite broadcast television system **129** can also be used in the media system of FIG. 1. The satellite broadcast television system **129** can be overlaid, operably coupled with, or replace the IPTV system as another representative embodiment of communication system **100**. In this embodiment, signals transmitted by a satellite **115** carrying media content can be received by a satellite dish receiver **131** coupled to the building **102**. Modulated signals received by the satellite dish receiver **131** can be transferred to the media processors **106** for demodulating, decoding, encoding, and/or distributing broadcast channels to the media devices **108**. The media processors **106** can be equipped with a broadband port to the ISP network **132** to enable interactive services such as VoD and EPG as described above.

In yet another embodiment, an analog or digital cable broadcast distribution system such as cable TV system **133** can be overlaid, operably coupled with, or replace the IPTV system and/or the satellite TV system as another representative embodiment of communication system **100**. In this embodiment, the cable TV system **133** can also provide Internet, telephony, and interactive media services.

It is contemplated that the present disclosure can apply to any present or next generation over-the-air and/or landline media content services system.

Some of the network elements of the IPTV media system can be coupled to one or more computing devices **130**, a portion of which can operate as a web server for providing web portal services over an Internet Service Provider (ISP) network **132** to wireline media devices **108** or wireless communication devices **116**.

Several forms of media services can be offered to media devices over landline technologies such as those described above. Additionally, media services can be offered to media devices by way of a wireless access base station **117** operating according to common wireless access protocols such as Global System for Mobile or GSM, Code Division Multiple Access or CDMA, Time Division Multiple Access or TDMA, Universal Mobile Telecommunications or UMTS, World interoperability for Microwave or WiMAX, Software Defined Radio or SDR, Long Term Evolution or LTE, and so on. Other present and next generation wireless network technologies are contemplated by the present disclosure.

Communication system **100** can also provide for all or a portion of the computing devices **130** to function as a coordination server (herein referred to as coordination server **130**). The coordination server **130** can use common computing and communication technology to perform function **162**, which includes among other things, coordinating a gaming session between communication devices, selecting a rendering server to assist a communication device with limited resources, and to control the exchange of gaming control information in a multiplayer setting. Communication devices such as references **106** and **116** can utilize gaming software applications to perform gaming functions **164** and **166** as will be described below.

Illustrative embodiments of method **600** shown in FIG. 6 can be applied to portions of the devices of FIG. 1.

FIG. 2 depicts an illustrative embodiment of a communication system **200** employing an IP Multimedia Subsystem

(IMS) network architecture to facilitate the combined services of circuit-switched and packet-switched systems. Communication system **200** can be overlaid or operably coupled with communication system **100** as another representative embodiment of communication system **100**.

Communication system **200** can comprise a Home Subscriber Server (HSS) **240**, a tElephone NUmber Mapping (ENUM) server **230**, and other common network elements of an IMS network **250**. The IMS network **250** can establish communications between IMS-compliant communication devices (CDs) **201**, **202**, Public Switched Telephone Network (PSTN) CDs **203**, **205**, and combinations thereof by way of a Media Gateway Control Function (MGCF) **220** coupled to a PSTN network **260**. The MGCF **220** need not be used when a communication session involves IMS CD to IMS CD communications. A communication session involving at least one PSTN CD may utilize the MGCF **220**.

IMS CDs **201**, **202** can register with the IMS network **250** by contacting a Proxy Call Session Control Function (P-CSCF) which communicates with an interrogating CSCF (I-CSCF), which in turn, communicates with a Serving CSCF (S-CSCF) to register the CDs with the HSS **240**. To initiate a communication session between CDs, an originating IMS CD **201** can submit a Session Initiation Protocol (SIP INVITE) message to an originating P-CSCF **204** which communicates with a corresponding originating S-CSCF **206**. The originating S-CSCF **206** can submit the SIP INVITE message to one or more application servers (ASs) **217** that can provide a variety of services to IMS subscribers.

For example, the application servers **217** can be used to perform originating call feature treatment functions on the calling party number received by the originating S-CSCF **206** in the SIP INVITE message. Originating treatment functions can include determining whether the calling party number has international calling services, call ID blocking, calling name blocking, 7-digit dialing, and/or is requesting special telephony features (e.g., *72 forward calls, *73 cancel call forwarding, *67 for caller ID blocking, and so on). Based on initial filter criteria (iFCs) in a subscriber profile associated with a CD, one or more application servers may be invoked to provide various call originating feature services.

Additionally, the originating S-CSCF **206** can submit queries to the ENUM system **230** to translate an E.164 telephone number in the SIP INVITE message to a SIP Uniform Resource Identifier (URI) if the terminating communication device is IMS-compliant. The SIP URI can be used by an Interrogating CSCF (I-CSCF) **207** to submit a query to the HSS **240** to identify a terminating S-CSCF **214** associated with a terminating IMS CD such as reference **202**. Once identified, the I-CSCF **207** can submit the SIP INVITE message to the terminating S-CSCF **214**. The terminating S-CSCF **214** can then identify a terminating P-CSCF **216** associated with the terminating CD **202**. The P-CSCF **216** may then signal the CD **202** to establish Voice over Internet Protocol (VoIP) communication services, thereby enabling the calling and called parties to engage in voice and/or data communications. Based on the iFCs in the subscriber profile, one or more application servers may be invoked to provide various call terminating feature services, such as call forwarding, do not disturb, music tones, simultaneous ringing, sequential ringing, etc.

In some instances the aforementioned communication process is symmetrical. Accordingly, the terms "originating" and "terminating" in FIG. 2 may be interchangeable. It is further noted that communication system **200** can be adapted to support video conferencing. In addition, communication system **200** can be adapted to provide the IMS CDs **201**, **202** with

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the multimedia and Internet services of communication system **100** of FIG. **1**. It is further contemplated that the CDs of FIG. **2** can operate as wireline or wireless devices. For example, the CDs of FIG. **2** can be communicatively coupled to a cellular base station **117** such as shown in FIG. **1**, a femtocell (not shown), a WiFi router, a DECT base unit, or another suitable wireless access unit to establish communications with the IMS network **250** of FIG. **2**.

If the terminating communication device is instead a PSTN CD such as CD **203** or CD **205** (in instances where the cellular phone only supports circuit-switched voice communications), the ENUM system **230** can respond with an unsuccessful address resolution which can cause the originating S-CSCF **206** to forward the call to the MGCF **220** via a Breakout Gateway Control Function (BGCF) **219**. The MGCF **220** can then initiate the call to the terminating PSTN CD over the PSTN network **260** to enable the calling and called parties to engage in voice and/or data communications.

It is further appreciated that the CDs of FIG. **2** can operate as wireline or wireless devices. Although not shown, the CDs of FIG. **2** can be communicatively coupled to a cellular base station **221**, a femtocell, a WiFi router, a DECT base unit, or another suitable wireless access unit to establish communications with the IMS network **250** of FIG. **2**. The cellular access base station **121** can operate according to common wireless access protocols such as Global System for Mobile (GSM), Code Division Multiple Access (CDMA), Time Division Multiple Access (TDMA), Universal Mobile Telecommunications (UMTS), World interoperability for Microwave (WiMAX), Software Defined Radio (SDR), Long Term Evolution (LTE), and so on. Other present and next generation wireless network technologies are contemplated by the present disclosure. Accordingly, multiple wireline and wireless communication technologies are contemplated for the CDs of FIG. **2**.

It is further contemplated that cellular phones supporting LTE can support packet-switched voice and packet-switched data communications and thus may operate as IMS-compliant mobile devices. In this embodiment, the cellular base station **221** may communicate directly with the IMS network **250**.

The coordination server **130** of FIG. **1** can be operably coupled to the second communication system **200** for purposes similar to those described above. It is further contemplated by the present disclosure that coordination server **130** can perform function **162** and thereby provide gaming services to the CDs **201-203** and **205** in FIG. **2** executing gaming software that performs gaming function **166**. The coordination server **130** can also select an application server **217** to perform game rendering functions for CDs **201-203** and **205**.

Illustrative embodiments of method **600** shown in FIG. **6** can be applied to portions of the devices of FIG. **2**.

FIG. **3** depicts an illustrative embodiment of a web portal **302** which can be hosted by server applications operating from the computing devices **130** of the communication system **100** illustrated in FIG. **1**. The web portal **302** can be used for managing services of communication systems **100-200**. A web page of the web portal **302** can be accessed by a Uniform Resource Locator (URL) with an Internet browser such as Microsoft's Internet Explorer™, Mozilla's Firefox™, Apple's Safari™, or Google's Chrome™ using an Internet-capable communication device such as those described in FIGS. **1-2**. The web portal **302** can be configured, for example, to access a media processor **106** and services managed thereby such as a Digital Video Recorder (DVR), a Video on Demand (VoD) catalog, an Electronic Programming Guide (EPG), or a personal catalog (such as personal videos,

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pictures, audio recordings, etc.) stored at the media processor **106**. The web portal **302** can also be used for provisioning IMS services described earlier, provisioning Internet services, provisioning cellular phone services, and so on.

It is contemplated by the present disclosure that the web portal **302** can further be utilized to manage and provision software applications **162**, **164**, **166** and **168**.

FIG. **4** depicts an exemplary embodiment of a communication device **400**. Communication device **400** can serve in whole or in part as an illustrative embodiment of the devices depicted in FIGS. **1-2**. The communication device **400** can comprise a wireline and/or wireless transceiver **402** (herein transceiver **402**), a user interface (UI) **404**, a power supply **414**, a location receiver **416**, and a controller **406** for managing operations thereof. The transceiver **402** can support short-range or long-range wireless access technologies such as Bluetooth, WiFi, Digital Enhanced Cordless Telecommunications (DECT), or cellular communication technologies, just to mention a few. Cellular technologies can include, for example, CDMA-1X, UMTS/HSDPA, GSM/GPRS, TDMA/EDGE, EV/DO, WiMAX, SDR, LTE, as well as other next generation wireless communication technologies as they arise. The transceiver **402** can also be adapted to support circuit-switched wireline access technologies (such as PSTN), packet-switched wireline access technologies (such as TCP/IP, VoIP, etc.), and combinations thereof.

The UI **404** can include a depressible or touch-sensitive keypad **408** with a navigation mechanism such as a roller ball, a joystick, a mouse, or a navigation disk for manipulating operations of the communication device **400**. The keypad **408** can be an integral part of a housing assembly of the communication device **400** or an independent device operably coupled thereto by a tethered wireline interface (such as a USB cable) or a wireless interface supporting for example Bluetooth. The keypad **408** can represent a numeric keypad commonly used by phones, and/or a Qwerty keypad with alphanumeric keys. The UI **404** can further include a display **410** such as monochrome or color LCD (Liquid Crystal Display), OLED (Organic Light Emitting Diode) or other suitable display technology for conveying images to an end user of the communication device **400**. In an embodiment where the display **410** is touch-sensitive, a portion or all of the keypad **408** can be presented by way of the display **410** with navigation features.

The UI **404** can also include an audio system **412** that utilizes common audio technology for conveying low volume audio (such as audio heard only in the proximity of a human ear) and high volume audio (such as speakerphone for hands free operation). The audio system **412** can further include a microphone for receiving audible signals of an end user. The audio system **412** can also be used for voice recognition applications. The UI **404** can further include an image sensor **413** such as a charged coupled device (CCD) camera for capturing still or moving images.

The power supply **414** can utilize common power management technologies such as replaceable and rechargeable batteries, supply regulation technologies, and charging system technologies for supplying energy to the components of the communication device **400** to facilitate long-range or short-range portable applications. The location receiver **416** can utilize common location technology such as a global positioning system (GPS) receiver capable of assisted GPS for identifying a location of the communication device **400** based on signals generated by a constellation of GPS satellites, thereby facilitating common location services such as navigation.

The communication device **400** can use the transceiver **402** to also determine a proximity to a cellular, WiFi, Bluetooth, or other wireless access points by common sensing techniques such as utilizing a received signal strength indicator (RSSI) and/or a signal time of arrival (TOA) or time of flight (TOF). The controller **406** can utilize computing technologies such as a microprocessor, a digital signal processor (DSP), and/or a video processor with associated storage memory such as Flash, ROM, RAM, SRAM, DRAM or other storage technologies.

The communication device **400** can be adapted to perform the functions of the media processor **106**, the media devices **108**, or the portable communication devices **116** of FIG. 1, as well as the IMS CDs **201-202** and PSTN CDs **203-205** of FIG. 2. It will be appreciated that the communication device **400** can also represent other common devices that can operate in communication systems **100-200** of FIGS. 1-2 such as a gaming console and a media player.

It is further contemplated by the present disclosure that the communication device **400** can operate as a coordination server, rendering server, or a mobile communication device. The controller **406** can be adapted in various embodiments to perform the functions **162**, **164**, **166** and **168** of any of the aforementioned devices. Illustrative embodiments of method **600** shown in FIG. 6 can be applied to portions of the communication device **400** of FIG. 4.

FIG. 5 depicts an illustrative embodiment of a system **500**. System **500** can comprise a coordination server **130** communicatively coupled to an IPTV network **502**. The IPTV network **502** can be communicatively coupled to an Intra-Carrier ISP network **504** and/or an Inter-Carrier ISP network **506**. The Intra-carrier ISP **504** can represent an ISP network that is managed by the same service provider of the IPTV network **502** and the coordination server **130** (referred herein as service provider A). The IPTV network **502** and Intra-carrier ISP network **504** can be configured by the coordination server **130** to provide preferred services to subscribers of the service provider A. The Inter-carrier ISP **506** can represent an ISP network managed by a service provider (herein service provider B) which may have an inter-carrier agreement with service provider A to share Internet services with service provider A.

By way of the inter-carrier ISP **506**, the IPTV network **502** of service provider A may access subscriber devices roaming in other networks as well as rendering servers **508** which may be called on by the IPTV network **502** to provide gaming services to mobile devices **512** by way of an access network **510**. The access network **510** can represent a landline access network with DSLAMs, or an access network with base stations that provide WiFi, WiMAX, or cellular communication services to mobile devices.

The IPTV network **502** may also access set-top box **514** by way of an access network **510** located within service provider A's communication system. The IPTV network **502** can also access a rendering server **508** to render gaming services to the set-top box **514** by way of access network **510**. Additionally, the IPTV network **502** can access a gaming console **516** by way of a combination of the intra-carrier ISP network **504** and the access network **510**.

The coordination server **130** can be adapted to coordinate a gaming session between communication devices **512**, **514** or **516**, to select a rendering server **508** to assist a communication device with limited resources such as **512** or **514**, and to control the exchange of gaming control information in a multiplayer setting.

FIG. 6 depicts an illustrative method **600** that operates in portions of the devices of FIGS. 1-5. Method **600** can begin

with step **602** in which the coordination server **130** initiates a multiplayer session between a communication device and at least one other device. This step can result from a request submitted by a user of one of the gaming devices. Suppose, for example, that the user of a mobile device **512** in FIG. 5 is interested in initiating a multiplayer game. The user can invoke an application in the mobile device **512** that submits a message by way of the Inter-carrier ISP network **506**, which is then forwarded to the coordination server **130** by way of the IPTV network **502**. The request submitted by the mobile device **512** can identify a multiplayer game to be initiated with a user (gamer) of the gaming console **516** and the game that is to be played between these devices. In step **604**, the coordination server **130** can determine the capabilities of the mobile device **512** and the gaming console **516**. If one or both of these devices require software to engage in the multiplayer game, the coordination server **130** can download this software.

The software downloaded in step **606** can represent software corresponding to the desired game in whole or in part. If the mobile device **512** is not capable of executing the game locally, the software downloaded to the mobile device **512** can represent a user interface for controlling the game as it is streamed from a rendering server **508**. The software when invoked in the mobile device **512** can, for example, segment a portion of the display for gaming controls and a portion for presenting a video stream corresponding to the game as shown in FIG. 5. If the gaming console **516** is able to execute the game locally but does not have a copy of the game, the coordination server **130** can download a full version of the game to the gaming console **516**. The full game can include versioning schemes of the game to accommodate a variable suite of features to enable equitable game sessions as will be discussed below. If the gaming software is available in either device, the coordination server **130** can skip step **606** and proceed to step **608**.

At step **606**, the coordination server **130** can identify inconsistencies between the resources of the mobile device **512** and the gaming console **516**, and determine that an unmitigated inconsistency may impact the gaming performance of either player of such devices. For example, the coordination server **130** may determine that the player using the gaming console **516** has an unfair advantage over the player with the mobile device **512** because the touch-screen gaming controls of the mobile device **512** are less sophisticated than the controls of a gaming controller **517** used with the gaming console **516**. The coordination server **130** may also determine that the response time of the touch-screen gaming controls may be noticeably slower than the gaming controls of the gaming controller **517** of the gaming console **516**. Similarly, the coordination server **130** may determine that the mobile device **516** has an accelerometer and/or gyroscope that provide three dimensional controls that the gaming controller **517** of the gaming console **516** does not have. The coordination server **130** may also determine other discrepancies between the mobile device **512** and the gaming console **516** such as disparate display resolutions, disparate screen sizes, disparate aspect ratios, disparate audio quality, and so on. The coordination server **130** can determine from these operational differences which features of each device may provide an unfair advantage to one player over another.

In step **610**, the coordination server **130** can mitigate these differences in whole or in part by instructing the mobile device **512** and the gaming console **516** to each adapt to a new operational configuration. The new configuration can result in the deliberate degrading of performance or disabling of one or more features in each device. In one embodiment, the

coordination server **130** can, for example, instruct the gaming console to execute one of a plurality of versions of the gaming software stored in a memory of the gaming console **516** in order to be feature-wise compatible with the mobile device **512**. The selected software version can represent a version that is known to be compatible with the mobile device **512**. In another embodiment, the coordination server **130** can download a version of the gaming software that is feature-wise compatible with the mobile device **512** if a desired software version is not already available in the gaming console **512**.

In one embodiment, the coordination server **130** can instruct the mobile device **512** and/or the gaming console **516** to downgrade or alter one or more features such as resolution, accelerometer/gyro, input response time, audio quality, display aspect ratio, and so on. In one embodiment, the coordination server **130** can also download software to the mobile device **512** and/or the gaming console **516** to resolve inconsistencies. The software can represent a patch, a replacement or update of a version of the gaming software, or combinations thereof. If inconsistencies can be resolved by provisioning the mobile device **512** and/or the gaming console **516**, then step **612** can be skipped. Instead a provisioning step (not shown) can be applied to adjust features in the mobile device **512** and gaming console **516** to mitigate game performance inconsistencies.

At step **614**, the coordination server **130** can be adapted to also determine the location of the mobile device **512** and the gaming console **516**, and whether these devices are operating within the intra-network **501**. Since the gaming console **516** is within the intra-network **501**, the coordination server **130** can manage the IPTV Network **502** and/or the Intra-Carrier ISP **504** to provide the gaming console **516** adequate services to engage in the requested gaming session. Furthermore, since the gaming console **516** can execute the gaming software locally, the coordination server **130** can determine that it does not have to provide rendering services. In the illustration of FIG. **5**, it is assumed that the mobile device **512** is roaming in a network that is not within the intra-network **501**. It is further assumed in this illustration that the mobile device **512** can execute the gaming controls locally, but does not have the ability to render the visual portion of the game without assistance.

Under these circumstances, the coordination server **130** can proceed to step **616** where it selects a game rendering server **508** that can provide rendering services to the mobile device **512**. The coordination server **130** can select the game rendering server **508** based on a proximity of the game rendering server **508** to the location of the mobile device **512**, and the capabilities of the mobile device **512** determined in steps **614** and **604**. Other factors can be considered by the coordination server **130** in the selection process such as the availability and capacity of other game rendering servers **508** (not shown, but inferred by the adjacent dots) coupled to the inter-carrier ISP **506** network, and the limitations of the inter-carrier ISP **506** to provide reliable data services to the mobile device **512** from one of the available game rendering servers **508**.

Once a game rendering server **508** has been selected, the coordination server **130** can instruct at step **618** the game rendering server **508** to execute gaming software corresponding to the game requested in step **602**. Once the gaming software has been executed, the coordination server **130** can nearly contemporaneously instruct the mobile device **512** and the gaming console **516** to initiate the multiplayer game session in the same step. At step **620**, the coordination server **130** can receive control information generated by the gamer of the mobile device **512** and the gamer(s) of the gaming console

516. A portion of the control information can result from the gamer of the mobile device **512** manipulating the gaming controls on the display of the mobile device **512** and/or manipulating the mobile device **512** in 3D space which causes the built-in accelerometer and/or gyro to generate control information. The other portion of the control information can come from gamer(s) manipulating one or more gaming controllers **517** communicatively coupled to the gaming console **516** as shown in FIG. **5**.

In step **622**, the coordination server **130** can coordinate the exchange of control information between the game rendering server **508** and the gaming console **512**. Since the mobile device **512** does not execute gaming software (other than a user interface for gaming controls) the control information generated by the gaming controller **517** associated with the game console **516** is directed by the coordination server **130** to the game rendering server **508** to cause the game to transition to other gaming states according to the control information (game stimuli) produced by the gaming controller(s) **517**. Once the game has been updated according to the game stimuli produced by the gaming controller(s) **517**, the gaming rendering server **508** can stream in step **624** the updated video game to the mobile device **512**. Upon receipt of the streamed data, the mobile device **512** can present the streamed video in the allotted portion of the display. The streamed content can also include the updated audio portion of the game which can be presented to the gamer by way of the speaker of the mobile device **512**, or a tethered or wireless (e.g., Bluetooth) headset.

Method **600** can be applied to communication devices of disparate types to enable them to engage in a multiplayer game session independent of location, and rendering resources of each device. Method **600** can also be applied to mitigate gaming performance inconsistencies caused by dissimilar resources of communication devices.

Upon reviewing the aforementioned embodiments, it would be evident to an artisan with ordinary skill in the art that said embodiments can be modified, reduced, or enhanced without departing from the scope and spirit of the claims described below. For example, method **600** can be adapted for a mobile device to mobile device gaming session, a mobile device to set-top gaming session, a gaming console to set-top box gaming session, a set-top box to computer gaming session, as well as other suitable combinations. Additionally, method **600** can be adapted for gaming sessions involving audio-only games with no video component, and vice-versa. In another embodiment, method **600** can be adapted for 3D gaming sessions. Thus, method **600** can be applied to any device with computing resources capable of engaging in a gaming session involving any suitable form of media content. Other embodiments are contemplated by the present disclosure.

FIG. **7** depicts an exemplary diagrammatic representation of a machine in the form of a computer system **700** within which a set of instructions, when executed, may cause the machine to perform any one or more of the methods discussed above. One or more instances of the machine can operate, for example, as coordination server **130**, a game rendering server **508**, a mobile device **512**, a set-top box **514**, a gaming console **516**, or other suitable devices capable of engaging in a game session. In some embodiments, the machine may be connected (e.g., using a network) to other machines. In a networked deployment, the machine may operate in the capacity of a server or a client user machine in server-client user network environment, or as a peer machine in a peer-to-peer (or distributed) network environment.

The machine may comprise a server computer, a client user computer, a personal computer (PC), a tablet PC, a smart

phone, a laptop computer, a desktop computer, a control system, a network router, switch or bridge, or any machine capable of executing a set of instructions (sequential or otherwise) that specify actions to be taken by that machine. It will be understood that a communication device of the present disclosure includes broadly any electronic device that provides voice, video or data communication. Further, while a single machine is illustrated, the term “machine” shall also be taken to include any collection of machines that individually or jointly execute a set (or multiple sets) of instructions to perform any one or more of the methods discussed herein.

The computer system **700** may include a processor **702** (e.g., a central processing unit (CPU), a graphics processing unit (GPU), or both), a main memory **704** and a static memory **706**, which communicate with each other via a bus **708**. The computer system **700** may further include a video display unit **710** (e.g., a liquid crystal display (LCD), a flat panel, or a solid state display). The computer system **700** may include an input device **712** (e.g., a keyboard), a cursor control device **714** (e.g., a mouse), a disk drive unit **716**, a signal generation device **718** (e.g., a speaker or remote control) and a network interface device **720**.

The disk drive unit **716** may include a tangible computer-readable storage medium **722** on which is stored one or more sets of instructions (e.g., software **724**) embodying any one or more of the methods or functions described herein, including those methods illustrated above. The instructions **724** may also reside, completely or at least partially, within the main memory **704**, the static memory **706**, and/or within the processor **702** during execution thereof by the computer system **700**. The main memory **704** and the processor **702** also may constitute tangible computer-readable storage media.

Dedicated hardware implementations including, but not limited to, application specific integrated circuits, programmable logic arrays and other hardware devices can likewise be constructed to implement the methods described herein. Applications that may include the apparatus and systems of various embodiments broadly include a variety of electronic and computer systems. Some embodiments implement functions in two or more specific interconnected hardware modules or devices with related control and data signals communicated between and through the modules, or as portions of an application-specific integrated circuit. Thus, the example system is applicable to software, firmware, and hardware implementations.

In accordance with various embodiments of the present disclosure, the methods described herein are intended for operation as software programs running on a computer processor. Furthermore, software implementations can include, but not limited to, distributed processing or component/object distributed processing, parallel processing, or virtual machine processing can also be constructed to implement the methods described herein.

While the tangible computer-readable storage medium **622** is shown in an example embodiment to be a single medium, the term “tangible computer-readable storage medium” should be taken to include a single medium or multiple media (e.g., a centralized or distributed database, and/or associated caches and servers) that store the one or more sets of instructions. The term “tangible computer-readable storage medium” shall also be taken to include any non-transitory medium that is capable of storing or encoding a set of instructions for execution by the machine and that cause the machine to perform any one or more of the methods of the present disclosure.

The term “tangible computer-readable storage medium” shall accordingly be taken to include, but not be limited to:

solid-state memories such as a memory card or other package that houses one or more read-only (non-volatile) memories, random access memories, or other re-writable (volatile) memories, a magneto-optical or optical medium such as a disk or tape, or other tangible media which can be used to store information. Accordingly, the disclosure is considered to include any one or more of a tangible computer-readable storage medium, as listed herein and including art-recognized equivalents and successor media, in which the software implementations herein are stored.

Although the present specification describes components and functions implemented in the embodiments with reference to particular standards and protocols, the disclosure is not limited to such standards and protocols. Each of the standards for Internet and other packet switched network transmission (e.g., TCP/IP, UDP/IP, HTML, HTTP) represent examples of the state of the art. Such standards are from time-to-time superseded by faster or more efficient equivalents having essentially the same functions. Wireless standards for device detection (e.g., RFID), short-range communications (e.g., Bluetooth, WiFi, Zigbee), and long-range communications (e.g., WiMAX, GSM, CDMA) are contemplated for use by computer system **700**.

The illustrations of embodiments described herein are intended to provide a general understanding of the structure of various embodiments, and they are not intended to serve as a complete description of all the elements and features of apparatus and systems that might make use of the structures described herein. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. Other embodiments may be utilized and derived therefrom, such that structural and logical substitutions and changes may be made without departing from the scope of this disclosure. Figures are also merely representational and may not be drawn to scale. Certain proportions thereof may be exaggerated, while others may be minimized. Accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense.

Although specific embodiments have been illustrated and described herein, it should be appreciated that any arrangement calculated to achieve the same purpose may be substituted for the specific embodiments shown. This disclosure is intended to cover any and all adaptations or variations of various embodiments. Combinations of the above embodiments, and other embodiments not specifically described herein, will be apparent to those of skill in the art upon reviewing the above description.

The Abstract of the Disclosure is provided with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, it can be seen that various features are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter lies in less than all features of a single disclosed embodiment. Thus the following claims are hereby incorporated into the Detailed Description, with each claim standing on its own as a separately claimed subject matter.

What is claimed is:

1. A computer-readable storage medium, comprising computer instructions, which when executed by a processor, cause the processor to perform operations comprising:
 - receiving from a communication device a request to initiate a video game with a remote device;
 - determining a location of the communication device;

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selecting a game rendering server from a plurality of game rendering servers according to the location of the communication device;

instructing the selected game rendering server to transmit a video stream associated with the video game responsive to determining that the communication device is unable to execute in whole or in part the video game from first computing resources of the communication device;

detecting at least one difference between the first computing resources of the communication device and second computing resources of the remote device;

instructing at least one of the communication device or the remote device to adapt a resource configuration to correct at least a portion of the at least one difference between the first and second computing resources;

receiving first control information generated by the communication device;

receiving second control information generated by the remote device; and

coordinating an exchange of the first control information and the second control information to enable a multi-player game of the video game between the communication device and remote device.

2. The computer-readable storage medium of claim 1, comprising computer instructions which, when executed by the processor, cause the processor to perform operations comprising receiving the first control information from the communication device.

3. The computer-readable storage medium of claim 1, comprising computer instruction which, when executed by the processor, cause the processor to perform operations comprising transmitting to the selected game rendering server the first control information and the second control information adapted according to the coordinated exchange, wherein the first control information and the second control information are applied by the selected game rendering server to the video game to modify a presentation of the video game and wherein an updated video stream representative of the modified presentation of the video game is transmitted to the communication device by the selected game rendering server.

4. The computer-readable storage medium of claim 1, comprising computer instructions which, when executed by the processor, cause the processor to perform operations comprising receiving the first control information from the selected game rendering server, wherein the first control information is received by the selected game rendering server from the communication device.

5. The computer-readable storage medium of claim 1, wherein the selected game rendering server is operable to:

receive from the coordination server the second control information adapted according to the coordinated exchange;

apply the first control information and the second control information to the video game to modify a presentation of the video game; and

transmit an updated video stream to the communication device representative of the modified presentation of the video game.

6. The computer-readable storage medium of claim 1, wherein the adapted resource configuration applied to at least one of the communication device or the remote device reduces an advantage to play the video game at either of the communication device and the remote device.

7. The computer-readable storage medium of claim 1, wherein the difference between the first and second computing resources comprises at least one of a difference in audio

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presentation resources, video presentation resources, input resources, output resources, and an availability of at least one gaming accessory.

8. The computer-readable storage medium of claim 1, comprising computer instructions which, when executed by the processor cause the processor to perform operations comprising:

determining a capability of the communication device to execute the video game;

identifying a software program for controlling at least one aspect of the video game according to the capability of the communication device; and

transmitting the software program to the communication device.

9. The computer-readable storage medium of claim 8, wherein the software program when executed by the communication device causes a presentation in a first portion of a display of the communication device, wherein the first portion comprises a user interface for controlling the at least one aspect of the video game, and wherein a second portion of the display is for presenting a video stream transmitted by the game rendering server.

10. The computer-readable storage medium of claim 1, wherein the coordination server and the selected game rendering server each operate from an Internet Protocol television communication system.

11. The computer-readable storage medium of claim 10, comprising computer instructions, which, when executed by the processor, cause the processor to perform operations comprising selecting at least one network element of the Internet Protocol television communication system to reduce latency of a video stream transmitted from the selected game rendering server to the communication device, wherein the at least one network element is selected according to at least one of the location of the communication device and the first computing resources of the communication device.

12. A method, comprising:

receiving, by a system including a processor, a request to coordinate execution of a gaming application between a communication device and a remote device;

selecting, by the system, a game rendering server from a plurality of game rendering servers according to a determination of at least one characteristic of the communication device;

instructing the selected game rendering server to transmit a stream associated with the gaming application responsive to determining that the communication device is unable to execute in whole or in part the gaming application from first computing resources of the communication device;

detecting, by the system, at least one difference between the first computing resources of the communication device and second computing resources of the remote device;

instructing, by the system, at least one of the communication device or the remote device to adapt a resource configuration to correct at least a portion of the at least one difference between the first and second computing resources;

receiving, by the system, first control information generated by the communication device;

receiving, by the system, second control information generated by the remote device; and

coordinating, by the system, an exchange of the first control information and the second control information between the communication device and the remote device.

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13. The method of claim **12**, wherein the at least one characteristic comprises at least one of a location of the communication device and the first computing resources of the communication device.

14. The method of claim **12**, wherein the communication device comprises one of a set-top box, a smart phone, and a computer, and wherein the gaming application presents at least one of audio content, video content, and a combination thereof.

15. A rendering server, comprising:

a memory for storing computer instructions; and
a processor coupled to the memory, wherein the processor, responsive to executing the computer instructions, performs operations comprising:

receiving instructions from a coordination server to transmit to a communication device a stream associated with a gaming application responsive to a determination by the coordination server that the communication device is unable to process in whole or in part the gaming application from first computing resources of the communication device;

transmitting the stream to the communication device;

receiving from the coordination server first control information and second control information, wherein the first control information is generated by the communication device, wherein the second control information is gen-

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erated by a remote device, wherein the coordination server is adapted to coordinate an exchange of the first control information and the second control information to enable a multiplayer game between the communication device and the remote device and wherein at least one of the communication device or the remote device are instructed to adapt a resource configuration to correct at least a portion of a detected difference between the first computing resources of the communication device and second computing resources of the remote device.

16. The rendering server of claim **15**, wherein the processor, responsive to executing the computer instructions, performs operations comprising receiving a request from the coordination server to adapt one or more features of the gaming application to reduce an advantage to play the gaming application from at least one of the communication device and the remote device.

17. The rendering server of claim **16**, wherein the processor, responsive to executing the computer instructions, performs operations comprising performing at least one of disabling or degrading the one or more features of the gaming application to reduce the advantage to play the gaming application from at least one of the communication device or the remote device.

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